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POLLUTION PREVENTION TOOL KIT

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Pollution Prevention
PROGRAM

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DEVELOPING A SUCCESSFUL POLLUTION PREVENTION PROGRAM FOR YOUR FACILITY

What is pollution prevention? Pollution prevention (P2) is reducing or eliminating the creation of pollutants or wastes at the source, through using less hazardous raw materials or using more efficient practices or processes. Pollution prevention includes reducing the use of energy, water, and other resources through increased efficiency or through conservation.

KEY COMPONENTS OF A SUCCESSFUL P2 PROGRAM

Management support and commitment. A successful P2 program requires everyone's involvement It is essential that the management of your facility be committed to P2, since they will be providing the support and resources required to implement a program.

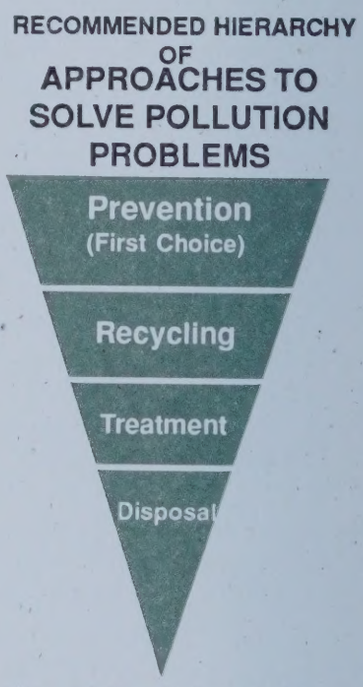
Employee involvement. Through training in proper hazardous materials management, good housekeeping, and pollution prevention, employees will incorporate P2 practices into their jobs.

Conduct a pollution prevention assessment. P2 assessments are useful for measuring wastes and emissions, and their sources. Assessments can assist facilities in identifying pollution prevention methods that are applicable to the company's operations.

Evaluate P2 options. This includes economic evaluation as well as technical feasibility, which could involve bench-scale or other tests of the new method.

Implement the recommended options and track results. Measuring the results of P2, which includes reductions in wastes/emissions and cost savings, is important for justifying P2 projects and obtaining support for future efforts.

Repeat the process periodically for continuous improvement. Introducing new or improved operating practices gradually, evaluating them and building on them makes sense. It allows you to build on your successes. Then you tackle more difficult to implement projects.



It is the policy of the Colorado Department of Public Health and Environment (CDPHE) that pollution prevention is the environmental management tool of first choice, i.e. that whenever feasible, pollution or waste should be prevented or reduced at the source. If the pollution or waste cannot be prevented, recycling is the next preferred approach, followed by treatment; and disposal or other release into the environment should be employed as a last resort. In addition, the use of recycled products rather than raw materials should be encouraged whenever feasible.

The information provided in this packet will help you perform a P2 assessment for your facility, and lists some P2 methods which have been successfully implemented by other businesses similar to yours.

Colorado Department of Public Health and Environment

A SMALL-BUSINESS GUIDE TO HAZARDOUS WASTE GENERATOR REQUIREMENTS

COLORADO Pollution Prevention PROGRAM

As a result of doing business, a company may generate hazardous wastes that can cause serious health and safety problems if not handled and disposed of properly. Such wastes can cause injury or death, and they may damage or pollute Colorado's land, air and water. The Colorado Hazardous Waste Regulations are in place to protect human health and the environment from the dangers of mismanaged hazardous wastes. The regulations are designed to protect you, your co-workers, your family and your community.

The Colorado Hazardous Waste Regulations list more than 400 hazardous wastes on four lists. These are called "listed wastes." Even if a waste does not appear on the list it is considered hazardous if: it is easily combustible or flammable (ignitable), it dissolves metals or other materials or burns the skin (corrosive), it is unstable or undergoes rapid or violent chemical reaction or produces toxic gases when mixed with water or other materials (reactive), or if it is a metal, pesticide, herbicide, or organic chemical found at high enough concentrations that it could be harmful or toxic if released into groundwater (toxic). These non-listed hazardous wastes are called "characteristic wastes."

Your business is likely to produce hazardous waste if you:

- Use petroleum products
- Use dyes, paints, printing inks, thinners, solvents or cleaning fluids
- Use pesticides or other related materials
- Use materials that dissolve metals, paint, wood, paper, or clothing
- Use flammable materials
- Use materials that burn or itch upon contact with skin
- Use materials that bubble or fume upon contact with water
- Receive delivery of products accompanied by a shipping paper or label indicating that the product is hazardous

How do I know if I am generating hazardous wastes?

1. Obtain a copy of the Colorado Hazardous Waste Regulations. Call the Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division, at (303)692-3300. *6 Colorado Code of Regulations (CCR) 1007-3, Section 261* describes the listing and identification of hazardous wastes.
2. Apply knowledge of your process and use Material Safety Data Sheets (MSDSs) for information regarding the products you use to determine if hazardous

waste is generated at your facility.

3. Send samples to a lab that is familiar with the methods of analysis for hazardous waste.
4. Talk to your trade organization.
5. Call the Hazardous Materials and Waste management Division, public assistance line at (303)692-3320.
6. Call the EPA's RCRA/Superfund Hotline at 1-800-424-9346.

How are generators of hazardous waste classified?

There are three generator classifications. These categories are based on the cumulative amount of hazardous waste generated in a calendar month and/or the amount of hazardous waste on site.

1. Conditionally Exempt Small Quantity Generators

   If you generate no more than 100 kilograms (about 220 pounds, or 25 gallons) of hazardous waste, and no more than 1 kilogram (about 2.2 pounds) of acutely[1] hazardous waste in any calendar month AND never accumulate more than 1000 kilograms of hazardous waste on your property, you are a conditionally exempt small quantity generator of hazardous waste.
2. Small Quantity Generators

   if you generate more than 100 and less than 1000 kilograms (between 220 and 2200 pounds, or about 25 to under 300 gallons) of hazardous waste, and no more than 1 kilogram (about 2.2 pounds) of acutely hazardous waste in any month AND never accumulate 6000 kilograms of non-acutely hazardous waste on site at any one time, you are a small quantity generator of hazardous waste.
3. Large Quantity Generators

   If you generate 1000 kilograms (about 2200 pounds, or 300 gallons) or more of hazardous waste, or more than 1 kilogram (about 2.2 pounds) of acutely hazardous waste in any month, you are a large quantity generator of hazardous waste.

HELPFUL PHONE NUMBERS:

Colorado Department of Public Health and Environment:

Pollution Prevention Program	(303)692-3009
For a copy of the Regulations	(303)692-3300
Public Assistance	(303)692-3320
For an EPA I.D. Number	(303)692-3300
24-hour Emergency Response Line	(303)756-4455

Other Phone Numbers:

National Response Center	1-800-424-8802
RCRA/Superfund Hotline	1-800-424-9346

Send Questions in Writing to:

Colorado Department of Public Health and Environment
Hazardous materials and Waste Management Division
HMWMD-HWC-B2
4300 Cherry Creek Drive South
Denver, CO 80222-1530

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[1] An acutely hazardous waste exhibits any of the characteristics identified in 6 CCR 1007-3, Section 261, Subpart C and is fatal to humans or animals in low doses or can cause or contribute to an increase in serious irreversible, or incapacitating reversible, illness. *6 CCR 1007-3, Sections 261.11 and 261.33.*

TABLE 1 - REQUIREMENTS FOR WASTE GENERATORS

	CONDITIONALLY EXEMPT SMALL-QUANTITY GENERATORS	SMALL-QUANTITY GENERATORS	LARGE-QUANTITY GENERATORS
QUANTITY LIMITS: The amount of all hazardous waste generated in any one month, not averaged over 12 months	Less than 220 lbs. of hazardous waste per month or less than 2.2 lbs. of acutely hazardous waste per month	Between 220-2200 lbs. of hazardous waste per month or ~2.2 lbs. of acutely hazardous waste per month	2200-or greater lbs. of hazardous waste per month or more than 2.2 lbs. of acutely hazardous waste per month
MANAGEMENT OF WASTE: Where you must send your waste for treatment, storage, and disposal	RCRA permitted facility	RCRA permitted facility	RCRA permitted facility
MANIFEST: A multicopy shipping document designed so that shipments of hazardous waste can be tracked from "cradle to grave"	May be required	Required	Required
EXCEPTION REPORT: This is required when the signed copy of the manifest is not returned from the treatment/disposal facility	Not required	Required after 60 days	Required after 45 days
BIENNIAL REPORT: A summary of a facilities hazardous waste generation activities during the previous year.	Not required	Not required	Required
PERSONNEL TRAINING: Classroom and on-the-job training that teaches facility personnel to perform their duties in a way that complies with RCRA	Not required	Basic training required	Required training for all employees with job responsibilities related to the generation or management of hazardous waste
CONTINGENCY PLAN: An emergency response plan that is designed to minimize hazards to human health or to the environment in the event of an accident involving hazardous waste.	Not required	Basic plan required	Full plan required
EPA ID NUMBER: Must be filed for with the Environmental Protection Agency	Not required	Required	Required
TOTAL ON-SITE STORAGE LIMITS OF ALL HAZARDOUS WASTE	May accumulate up to 2197 lbs.	May accumulate up to 13,200 pounds for up to 180 days or 270 days if waste is to be transported over 200 miles	May accumulate any quantity up to 90 days
STORAGE REQUIREMENTS	None	Basic compliance with the technical standards under part 265 for containers or tanks	Full compliance with technical standards under part 265 for containers or tanks

This guide was compiled by the Colorado Department of Public Health and Environment's Pollution Prevention Program with assistance from the Hazardous Materials and Waste Management Division.

Colorado Department of Public Health and Environment

POLLUTION PREVENTION CHECKLIST FOR PRINT SHOPS

COLORADO Pollution Prevention PROGRAM

Creating a Successful Pollution Prevention Program:

Establishing a pollution prevention (P2) program can result in significant cost savings while improving your facility's environmental performance, employees' health, and public image. Successful P2 programs depend on management support, leadership by a pollution prevention coordinator or team, and the involvement and training of all employees.

Use of this checklist.

Answering the following questions will help you assess your current P2 activities. Any "No" answers indicate areas you may wish to investigate further.

Good Operating Practices

		YES	NO
1.	Do you keep tight fitting lids on containers when not in use, especially for solvents?		
2.	Do you regularly inspect for and repair all leaks?		
3.	Are employees trained in preventing and containing spills?		
4.	Do you purchase materials only as needed and use a "first in, first out" policy? Do you keep accurate records of amounts of inks, solvents, and fountain solution used?		
5.	Do you inspect raw materials and return unacceptable or damaged goods, including inks, to the supplier?		
6.	Are photo-processing and plate-developing chemicals properly stored to minimize spoilage?		
7.	Are all chemical containers properly labeled?		
8.	Do you examine the MSDSs of all new products being tried, and try to use products with less hazardous ingredients and lower in VOCs?		
9.	Do you limit your acceptance of trial chemicals from vendors to those you may be truly interested in?		

Printing and Finishing

		YES	NO
1.	Have you tried alternative fountain solutions which are lower in alcohol or alcohol-free? Many companies have successfully eliminated alcohol from their fountain solutions, significantly reducing emissions of VOCs and lowering the risks to the health and safety of their workers.		

2.	Do you use water-miscible cleaning products to clean rollers and blankets? This helps extend the life of rollers and blankets and improve printing quality. Have you tried low VOC (<50% VOC), water-miscible cleaning products? Low VOC cleaning products are available which are effective for cleaning rollers and blankets, although they tend to dry more slowly. Using lower VOC cleaning products will reduce your VOC emissions, lower the risks to worker health and safety, and reduce hazardous waste generation. If the flash point of the product is below 140°F and the product does not contain listed hazardous.		
3.	Do you use an automatic blanket washing system?		
4.	Do you clean ink fountains only when changing to a different color or when the ink might dry out between runs?		
5.	Do you try to adopt a standard ink sequence to minimize the need for cleaning?		
6.	Do you sequence off excess ink before cleaning rollers with solvents or other cleaners?		
7.	For lithographic printing, have you tried vegetable oil-based, low VOC inks?		
8.	For flexographic printing, have you tried water-based inks?		
9.	Do you calculate/estimate the amount of ink needed as carefully as possible to minimize waste?		
10.	Do you recycle waste inks, either on-site or by sending them off-site for recycling?		
11.	Do you distill and reuse waste solvent on-site?		
12.	Do you use water-based coatings which are low in ammonia?		

Image and Plate Processing

		YES	NO
1.	Have you considered electronic imaging and laser platemaking?		
2.	Are you using water-based plate processing? Do you recycle used plates?		
3.	Have you tried extending the life of processing chemicals by adding replenishers?		
4.	Do you recover silver from spent photographic chemicals, either on or off-site?		
5.	Is used fixer treated prior to disposal?		
6.	Do you recycle spoiled photographic film?		

Waste Paper and Containers

		YES	NO
1.	Do you minimize generation of waste paper? Do you segregate waste paper and recycle?		
2.	Do you use recycled paper?		
3.	Do you recycle empty 5-gallon and 55-gallon containers?		
4.	Do you recycle other packaging wastes such as shrink wrap and corrugated cardboard?		

This checklist was compiled by the Colorado Department of Public Health and Environment's Pollution Prevention Program. For more information call Parry Burnap, Program Manager at (303)692-3009 or Neil Kolwey, Professional Engineer at (303)692-3309.

Colorado Department of Public Health and Environment

Fact Sheet - Reducing Alcohol in Fountain Solutions

Colorado Pollution Prevention Program

Advantages of reducing alcohol in your fountain solutions:

1. Lower VOC emissions
2. Safer, healthier work environment
3. Longer roller and blanket life (alcohol is hard on rollers and blankets)
4. Improved printing quality (alcohol deglosses ink)
5. Possible reduction in operating costs

For lithographic printers, the use of isopropyl alcohol in fountain solutions is a significant source of VOC emissions. Most printers use concentrations of 15-25% alcohol in their fountain solutions, with some small printers using concentrations up to 35% or more.

Many printers, without too much difficulty, have been able to reduce the alcohol concentration in their fountain solution to 5-10%. For most printers achieving this concentration would be a significant improvement and would result in a significant reduction in VOC emissions. While it is also possible to eliminate alcohol use completely (through the use of alcohol substitutes), complete elimination requires more changes to the printing system and tends to be more difficult to implement. The following information focuses on achieving a significant reduction in alcohol use without alcohol replacements.

How do I reduce alcohol in my fountain solutions?

You may need to modify your current system, including your operating practices, to maintain consistent printing quality while you are reducing the alcohol concentration in your fountain solution.

The key system changes are:

- **Maintain consistent water quality**

  You may need to switch to higher quality water for your fountain solutions, by either purchasing distilled water or installing a reverse osmosis water treatment system.

  Note: most larger shops have reverse osmosis units and many smaller shops purchase distilled water.

It is important that you have the motivation to make the necessary changes. Keep in mind that the modifications required can take some time to implement and you may experience some initial set-up problems.

✺Monitor and maintain fountain solutions

You may need to monitor pH and/or conductivity to maintain your fountain solutions and your printing quality. You should add water, fountain solution concentrate, or alcohol only as needed. If you have a recirculating fountain solution system, adding filters will help maintain the quality of the fountain solution and also extend its life. Filters can remove impurities such as paper dust and lint, as well as ink residue.

✺Lower Durometer rollers

You should use lower durometer rollers (22-25) and properly maintain your rollers and blankets.

Where can I get Additional information and assistance?

Talk to the vendor that supplies you with fountain solutions. Often they can offer you technical assistance and provide further information about how you can reduce your alcohol use. The Pollution Prevention Program at the Colorado Department of Public Health and Environment can furnish you with a list of printers in Colorado who have successfully reduced their alcohol use. Please call Neil Kolwey at (303) 692-3309 for a copy of the list.

This fact sheet was compiled by the Colorado Department of Public Health and Environment's Pollution Prevention Program with the assistance of the Iowa Waste Reduction Center. For more information call Parry W. Burnap, Program Manager, at (303)692-3009 or Neil Kolwey, Professional Engineer, at (303)692-3309.

Solid and Hazardous Waste Education Center
Waste Education Series
Cooperative Extension • University of Wisconsin—Extension
425.WP.9410

Management of Solvents and Wipes in the Printing Industry

Printers use solvents and wipes to clean oil-based ink from equipment. Solvent cleaning typically generates hazardous waste solvents, and used cleanup wipes contaminated with ink and solvent residue. By minimizing and recycling hazardous solvent waste, printers can save money while protecting their workers and the environment. This fact sheet provides general guidance on reducing and managing solvent related wastes. For an official interpretation of regulatory requirements for specific situations, contact the nearest district office of the Department of Natural Resources (DNR).

Why is Proper Management of Cleanup Wipes Important?

Printers typically use either leased fabric towels or disposable wipes for cleaning presses. Either type of wipes can become an environmental hazard, and expose printers to expensive environmental cleanup costs, if not managed properly.

Leased Towels

Leased towels are typically sent to an industrial laundry for cleaning. Rags contaminated with solvent are not considered hazardous wastes under federal and state regulations if they are **not saturated** (saturated rags can be rendered non-hazardous by wringing or centrifuging) and are **laundered** and **reused**. The effluent emitted from the spent towels at the laundry can become a concern to the local regulatory agency that oversees the sanitary system as the contaminants are washed out into the wastewater. It is the presence of these inks and solvents that create problems for the industrial laundry and the community sanitary sewer system that handles the effluent from the laundry. Printers can be part of the solution by reducing the amount of solvents in rags sent to laundries. Please see side bars on last page for vendors of launderable towels.

Disposable Wipes

Users of disposable wipes need to be very careful about how the used wipes are disposed if they are to remain in compliance with regulatory requirements and minimize corporate environmental liabilities. Used wipes may be subject to hazardous waste regulations if the wipes contain solvents or residues (e.g. heavy metals such as lead and chrome) that are classified as hazardous. However, even if the wipes do not contain hazardous solvents or residues, it may not be in the best interest of the generating printer to dispose of their wipes with the rest of its trash. Contaminants that can leach out of the wipes at a landfill can expose the generator to expensive remediation costs if the landfill that is used is determined to be causing ground water contamination. If disposable wipes are used, it is important that the generators have an accurate, comprehensive picture of all of the solvents and residual contaminants that could remain on used wipes from the plant.

Why Reduce and Recycle Solvent Waste?

- ***Reduced*** compliance requirements
- ***Reduced*** hazardous waste management and liability costs
- ***A safer*** workplace for employees
- ***Cost savings*** when total volume of solvents used is reduced
- ***Improved*** corporate image with customers and neighbors
- ***Reduced*** tax burden from generator and land disposal fees
- ***Reduced*** threat to the environment

Note: For additional information about preventing waste in the printing industry, contact SHWEC Pollution Prevention Specialists at **608\262-0385.**

How can the amount of solvent waste be reduced?

Reduce the Need for Cleaning

Improve production methods by coordinating runs according to color, type or quantity, thereby reducing the number of cleanups.

- Use standard sequence on process colors to minimize color changes for presses.
- Run similar jobs simultaneously to reduce cleanup.
- Clean ink fountains only when changing color; use spray skin overnight.

Use Alternative Solvents

Review the types of inks used, and the solvents needed to clean presses after their use. Possible alternatives include:

- Choose a solvent that ***minimizes hazardous waste and air pollution***. Carefully review the material safety data sheets (MSDS) when considering purchasing a cleaner. Try to avoid cleaning solutions with solvents or chemicals that would cause used cleaners to be classified as hazardous because of toxicity or flammability (see DNR's "Very Small Generator Guide" for further information). To reduce air pollution, try to use cleaners with a low (no more than 30%) VOC content, and a low vapor pressure (less than 10 mm mercury).
- ***Use water-based inks*** whenever possible in flexographic and gravure applications. These inks, are typically less toxic and have a much lower volatile organic compound (VOC) content, and therefore will reduce disposal costs and air emissions.

Reduce Solvent Use in Cleanup

When solvents are essential to cleanup, alternative cleaning methods can reduce the amounts of solvents used and can result in cost savings.

- Avoid soaking wipes in solvent. Use pump or squeeze bottles to dampen wipes.
- Use automatic blanket washes.
- Utilize parts washing equipment as an alternative to towels for cleaning the trays that collect the solvents and inks below each press roller.
- A parts washing unit with recirculating solvent can be used. Trays are removed from the press and placed in the washer unit where solvent is used in a closed washing system to remove the ink.

Methods for Reducing Solvent Wastes

- ***Reduce*** the need for cleaning
- ***Use*** alternative solvents
- ***Reduce*** solvent use in cleanup
- ***Closely manage*** the dispensing and storage of solvents and wipes
- ***Separate*** excess solvent from cleanup wipes
- ***Collect*** all solvent wastes for recycling
- ***Establish accountability*** for solvent use and waste generation
- ***Educate*** customers

Remove Excess Solvent from Wipes

Excess solvent can be removed from used wipes by hand wringing, mechanical wringing, or spinning in a centrifuge. Be sure that the recovered solvent is stored in a closed, clearly marked container. When installing a centrifuge, be sure to check local fire codes that may affect ventilation and electrical requirements.

Collect Solvent Waste for Recycling

Use efficient methods of collecting solvent waste while reducing the chance of spills.

- *Provide* clearly marked drums or containers to collect solvent waste.
- *Modify* drain trays as necessary to make it easy and neat to pour or drain collected solvents into storage drums.
- *Add* receiving funnels with automatically closing covers to storage containers to decrease spills and air pollution from evaporation.

Increase Accountability for Solvent Usage

Using an inventory control program that tracks solvent use and waste generation, make departments financially accountable for their waste streams. Have one person responsible for oversight of solvent storage and dispensing. Provide regular feedback to departments on waste minimization performance.

Educate Customers

Printers can help customers understand the processes and environmental impacts associated with the use of various inks, papers, and coatings. Show customers that their choices can reduce your need to use cleanup solvents and inks with environmentally problematic constituents. Most customers want to do the right thing, when presented with affordable, environmentally-preferable choices.

Who makes waste reduction a success?

Employee cooperation and commitment is essential. Encourage employees to help identify waste reduction opportunities and understand the changes in procedures and equipment required to achieve waste reduction goals.

Management commitment to a workable solution shows employees that waste reduction is a priority. Keep waste reduction programs visible and communicate goals and accomplishments regularly.

Dispensing and Storage Tips

- ***Cover*** solvents to reduce evaporation
- ***Dispense*** solvents from a central source
- ***Track usage*** at individual press or operator level
- Do not allow ***personal supplies*** of cleanup solvents
- ***Limit the access*** to disposable wipes and number of wipes available

Methods for Removing Solvents from Wipes

- ***Use*** a hand-operated wringer
- ***Squeeze*** or ***wring*** out wipes by hand
- ***Install*** an explosion-proof centrifuge to spin wipes dry

* DNR regulations prohibit air drying of wipes contaminated with solvents that classify as hazardous waste

* See following page for **vendor of solvent recovery equipment.**

Vendors of Solvent Recovery Equipment

Hand-Operated Wringers

Environmental Management Products, Inc.
P.O. Box 1310
Ballwin, MO 63022-1310
(800) 779-2047
(314) 256-0047

Alden Industries
2716 Royal St. Box 3027
New Orleans, LA
(504) 944-7681

Local Sales Rep:
Lab Safety Supply
P.O. Box 1368
Janesville, WI 53547-1368
(800) 356-0783

Ostrin Laundry and Machinery Co.
842 12th Ave. N.E.
Minneapolis, MN 55413
(612) 378-9631

Solvent Recovery and Recycling Systems

Environomics, Inc.
955 Industrial Road
San Carlos, CA 94070
(415) 592-2552

On-Site Solvent Extraction Service

McCarty Water and Waste
6250 Highway 12W
Maple Plain, MN 55359
(612) 479-4343

Explosion-proof Centrifuges

Bock
3600 Summit Street
Toledo, OH 43611
(419) 726-2645

SHWEC, by providing this list, does not endorse or certify specific companies.
Wayne P. Pferdehirt, P.E., and Kristin Andersen, 10/94.

Suppliers of Launderable Towels

- ***Industrial Towel and Uniform***
  Local ITU Rep
  (414) 782-1950
- ***Spic and Span Industrial Services Division***
  Milwaukee
  (414) 964-5050
- ***Ideal Uniform Service***
  Milwaukee
  (414) 257-2262
  Madison
  (608)251-5442
- ***Bay Towel-Linen & Uniform Rental***
  Green Bay
  (800) 242-5606
- ***All Rental Garment Company, Inc.***
  Madison
  (608) 256-5060

❖ For More Information, Contact Your County Extension Agent or SHWEC ❖

County Extension Information

SHWEC Offices

UW—Green Bay
University of Wisconsin
Environmental Science 317
2420 Nicolet Drive
Green Bay, WI 54311
414/465-2707
FAX 414/465-2143

UW—Madison
610 Langdon Street, Rm. 529
Madison, WI 53703
608/262-0385
FAX 608/262-6250

UW—Stevens Point
College of Natural Resources
University of Wisconsin
Stevens Point, WI 54481
715/346-2793
FAX 715/346-3624

SHWEC and UW—Extension provide equal opportunities in employment and programming.

Solid and Hazardous Waste Education Center

Waste Education Series

Cooperative Extension • University of Wisconsin-Extension

425.WP.9508

LITHOGRAPHIC INK WASTES: *How to Reduce, Reuse, and Recycle ink waste*

PURPOSE

This fact sheet discusses several ink management techniques that increase the opportunities to prevent, reuse, and recycle waste ink. A list of ink recycling service providers is also included.

Ink waste costs the printer for disposal, but also represents a less than optimum use of purchased raw materials. In the extremely competitive world of commercial printing, reducing ink wastes and their costs just makes good business sense.

MANAGING INK WASTE

Reduce ink waste and you reduce your ink disposal costs.

Most lithographic inks are not classified as hazardous wastes under state and federal regulations. The exception is if an ink contains pigments with heavy metals (for example, cadmium, lead or chromium), or if the ink is mixed with solvents classified as hazardous wastes.[1] Proper disposal of ink wastes can be expensive, but is necessary to meet regulatory compliance requirements, and at least as importantly, to minimize liabilities faced by a printer. To be landfilled, waste ink must be in a non-liquid state or otherwise stabilized.

[1] See the DNR's Small Quantity Generator Guide (Publ SW-071 93REV, avail. from DNR at 608/267-9523) for a full discussion of hazardous waste identification and management requirements.

Many printers dispose of their inks by sending them to a fuel-blending service, which combines and forwards these and other wastes for burning at industrial boilers or kilns. Burning the inks reduces the potential exposure to litigation and cleanup costs to which a printer could otherwise be exposed if a landfill is used and it experiences groundwater contamination problems.

Ink disposal can be expensive and result in environmental liability.

Whether waste inks are burned or landfilled, costs can be reduced by minimizing the generation of ink wastes and internally re-using inks whenever possible. Recycling services can sometimes be used to reclaim remaining waste inks, although presently these services are more practical for web press operations, especially those with larger amounts of waste inks. Whether ink can be reused or recycled is dependent upon the quality of the ink waste that is generated. Waste ink can typically be classified in one of the following two categories:

Uncontaminated, excess ink -- this category includes ink that has not been used in the press fountain. Although it can be recycled, reuse of this ink is usually a more cost-effective means of managing it.

Contaminated, combined ink -- this ink has been used in the press fountain and is commonly contaminated with paper fibers, solvents, or other colors of ink. For these inks to be recycled, they typically must be filtered, reconditioned and reblended. The remainder of this fact sheet addresses strategies for reducing ink wastes, internally reusing inks whenever possible, and using recycling services for remaining inks when use of these services is technically and economically practical.

REDUCING THE VOLUME OF WASTE INK GENERATED

Reuse uncontaminated excess ink and recycle contaminated combined ink.

There are many practical ways for sheetfed and web lithographic printers to reduce the volume of waste ink generated:

- Help press operators to accurately estimate the amount of ink needed for each job through training in ink estimating techniques. Keep accurate records of the quantity of ink that is used for specific jobs, particularly for repeat customers' jobs or re-orders.
- Use a standard ink sequence - from light to dark ink.
- Monitor your ink inventory and use existing stock according to the "first in - first out" strategy. Test any out-of-date ink for useability before you consider it waste ink.
- Carefully label, log, and store special-order colors for future use rather than dumping them into waste ink drums.
- Donate product ink that you no longer use to schools, or give the ink to other printers, rather than pay for disposal.
- Use an automatic ink leveller to maintain the desired ink level in the fountain.
- Dedicate presses to specific colors or special inks to decrease the number of cleanings required for each press.

Estimate ink needs accurately and manage your ink inventory wisely to reduce the overall volume of waste ink generated.

INK MANAGEMENT TECHNIQUES FOR BETTER REUSE AND RECYCLING OPPORTUNITIES

To maximize the opportunities for ink reuse and recycling:

Keep ink that has been separated by color and type, free from contaminants, in order to maximize opportunities for ink reuse and recycling.

- Do not mix different colors of ink.
- Keep different types of ink separate.
- Store excess ink in properly sealed and labelled containers. Place plastic or waxed paper on top of sheetfed ink, or spray the ink with an anti-skinning agent, or cover the ink with an oil consistent with printing inks to prevent oxidation.
- Do not dip knives deeply into sheetfed inks. Removing the ink evenly from the top surface of the ink can reduces the surface area of the ink exposed to oxidation.
- Transfer used ink back to the original containers and prevent drying by keeping the ink containers sealed.
- Clearly mark the containers used to collect waste ink and prevent contamination with solvents and trash (e.g., floor sweepings, cigarette butts, etc.).
- Don't treat excess ink as waste. Instead, manage it like a manufacturing by-product that should be re-introduced, as much as possible, back into the manufacturing system.

REUSING EXCESS INK

Excess ink results from overestimating ink usage at the press or at the time of ink purchase. Whenever possible, return unopened cans of excess ink to the supplier. Reusing excess ink in one of the manners described below can reduce both your virgin ink purchasing costs and your waste ink disposal costs:

- Mix excess ink, including black and/or colored inks, on-site to produce black ink. Many printers like the quality of the black ink produced from mixing colored inks, because the colored inks are of such a high quality.
- Mix excess ink with virgin ink of the same color, provided that the excess ink is contaminant-free.
- Use a computer software program, such as "The MixMaster" to keep track of ink in your inventory and to produce recipes for needed PMS colors from excess ink in stock.

Computer programs for PCs can be used to develop recipes for mixing required colors from existing inventory. Relatively inexpensive software is available from printing supply companies.

RECYCLING WASTE INK

Ink recyclers take waste inks, and reprocess them, along with necessary additives to make new ink. Opportunities for recycling web inks are growing, but are currently very limited for sheetfed inks. Consider the following advantages to recycling waste ink:

- The cost of fuel-blending or landfilling the ink can be avoided. Typically the cost is $100 to $400 per 55-gallon drum.
- Liability associated with ink disposal is minimized.
- The recycled ink meets new ink specifications and is available to you at a savings compared to new ink prices.
- Business with environmentally sensitive customers may increase, if they are aware that you recycle.

Typically, ink recycling service providers filter the ink to remove impurities, mix the ink with oil or otherwise adjust its physical characteristics, and then blend the ink with new ink to ensure that product specifications are being satisfied. Some ink recyclers will mix colored inks to produce black inks. Others have the capability of recycling color for color, if large volumes of colored ink are generated.

Current Status of the Availability of Ink Recycling Services

SHWEC has identified ink recyclers that serve printers located throughout the United States and Canada. Each of these companies offers recycling services for both heatset and non-heatset inks from web presses. Currently only two companies recycle sheetfed inks.

See Table 1 for a list of sheetfed ink recyclers, and Table 2 for a list of web-ink recyclers.

Economies of scale associated with ink volumes affect the feasibility of recycling; therefore, accumulating a large quantity of waste ink reduces the cost of recycling the ink on a per pound or per drum basis. This is one reason why there are more web-ink recyclers in operation than sheetfed ink recyclers. However, as demand increases, and the technology for processing sheetfed ink improves, it is likely that the availability and affordability of sheetfed ink recycling will increase. Another limitation on the recycling of sheetfed inks is the difficulty of removing "skinning" layers, which are caused by drying agents in the ink.

Removing and disposing of each "skin," or dry layer, is necessary to produce good quality recycled ink; however, the process is labor intensive, and reduces the overall volume of ink available for recycling. "Skinning" can be prevented by placing an anti-oxidant material in waste sheetfed ink drums, or by covering the ink with a thin layer (1/2 inch) of oil that is compatible with the ink.

EXAMPLE OF A MINNESOTA LITHOGRAPHIC PRINTER THAT REUSES & RECYCLES INK

General Litho Services, a sheetfed offset printer with 60 employees in the Minneapolis area had been purchasing almost all of its inks pre-mixed to job color specifications. Orders always included "a little extra" so that the press wouldn't run out in the middle of a job. Over a few years $7,000 of extra ink had accumulated in the storeroom. To avoid high disposal costs, and get the optimum benefit from the ink that had been purchased, General Litho decided to try "The MixMaster" software program and begin mixing its own inks from the accumulation in their storeroom. The company used "The MixMaster" to store a profile of its ink inventory and develop recipes for using those inks to produce PMS colors. General Litho also achieved cost savings by increasing the accuracy of its ordering process for inks used on incoming jobs. A table was developed that helped production staff better realize the different coverages of different colors of ink. By using this tool, mixing ink on-site, and placing additional emphasis on accurately ordering ink, General Litho achieved substantial reductions in ink wastes and purchase costs. In 3 months time, ink waste quantities were reduced by 10% even though sales increased by 22%. More recently, General Litho has been sending its waste inks to Envirecycle Ink Recovery, in Bloomington, MN.

General Litho effectively uses the ink that accumulates in their storeroom by mixing their own colors right in the plant.

EXAMPLE OF A WISCONSIN LITHOGRAPHIC PRINTER THAT REUSES & RECYCLES INK

By reusing and recycling ink, Quad/Graphics reduced their rate of waste ink generation from 17 drums per month to 1 drum.

Quad/Graphics, headquartered in Pewaukee, Wisconsin, is a 5,300-employee, web offset and rotogravure printer of catalogs, magazines, and coupon inserts for newspapers. A team of press operators was asked by company management to study ink waste generation and to recommend a reduction plan. The team found that the Pewaukee plant was generating more than seventeen 55-gallon drums of heatset waste ink each month. As a result of the study, Quad/Graphics' ink manufacturer was asked to evaluate opportunities for producing new ink from waste ink. The recycling strategy used includes the separation of uncontaminated, excess ink from contaminated, combined ink. Excess ink is reused after being blended with virgin ink, and contaminated ink is recycled and then mixed with virgin black ink. Consequently, ink waste volumes dropped to one 55-gallon drum per month, saving more than $257,000 a year in ink purchases and nearly $39,000 a year on ink disposal.

SUMMARY

Cost savings and a reduction in environmental liability can be achieved by following the guidelines for reducing, reusing, and recycling ink. Environmental initiatives such as those described in this fact sheet are sound business practices with positive economic benefits. In addition, waste ink reduction, reuse and recycling appeals to environmentally sensitive customers. Printers can reduce costs, liabilities, and wastes by using the suggestions contained in this fact sheet.

Ink Recycling: Service Providers (Tables 1 & 2)

TABLE 1: Sheetfed Lithographic Printer's Ink

Company	Ink Recycled	Process	Service Area	Min. Requirements	Reporte
Envirecycle Ink Recovery 7854 12th Avenue South Bloomington, MN 55420 Contact: Dave Erickson (612) 854-5630	Sheetfed recycled into sheetfed ink Mixed colors to black Black to black Color to black	Filtration off-site	Entire U.S. and Central and Western Canada	200 lbs or 1/2 drum.	Recycled 15 to 25 pound tha new blac
3R Corporation 800 Vinial St. Pittsburgh, PA 15212 Contact: Katie Jones (412) 323-1733	Sheetfed recycled into heatset web ink Mixed colors to black Black to black Color to black	Filtration off-site	Entire U.S.	No minimum.	Recycled with virgi

TABLE 2: Web Lithographic Printer's Ink

Company	Ink Recycled	Process	Service Area	Min. Req'ts	Report
Envirecycle Ink Recovery 7854 12th Avenue South Bloomington, MN 55420 Contact: Dave Erickson (612) 854-5630	Web heatset and non-heatset Mixed colors to black Black to black Color to black	Filtration off-site Also handles flexographic ink	Entire U.S. and Central and Western Canada	400 lbs or 1 drum.	Recycle pound th
MRS 1115 Shore Street West Sacramento, CA 95691 Contact: Greg Pope (713) 621-1874	Web heatset and non-heatset Mixed colors to black Black to black Color to color	Centrifuge-based system Processes on-site in trucks	Entire U.S.	Variable.	Ink recla Modifyi the press costs an Cost incl avoiding
3R Corporation 800 Vinial St. Pittsburgh, PA 15212 Contact: Katie Jones (412) 323-1733	Web heatset and non-heatset Mixed colors to black Black to black Color to color	Filtration off-site	Entire U.S.	No minimum.	Recycle with vir
Pro Active Recycling 1180 20th St. East P.O. Box 368 Owen Sound, Ontario Canada N4K 5P5 Contact: Bert Wakeford (519) 371-6511	Web heatset and non-heatset Mixed colors to black Black to black Color to color	Centrifuge and filter based Processes on-site in trucks	Canada, and Eastern and Central U.S.	200 gal/month depending on existing services provided in your area.	Recycle 66% of or blendi

*Additional savings result from avoiding disposal costs for used ink.

COLORADO POLLUTION PREVENTION
CASE STUDIES

for the

PRINTING INDUSTRY

By Joni Canterbury and Neil Kolwey, Colorado Department of Public Health and Environment Pollution Prevention Program, (303) 692-3309.

Preface

The case studies in this compendium were researched and written by Ms. Joni Canterbury, a graduate student intern of the Colorado Department of Public Health and Environment (CDPHE) Pollution Prevention Program. The project was sponsored by the Colorado Pollution Prevention Advisory Board (PPAB), and was supervised by Neil Kolwey of the CDPHE P2 Program, with input from Parry Burnap, the CDPHE P2 Program Manager.

We would like to thank the companies in these case studies for taking the time to help us document their pollution prevention successes and their willingness to share their information with other businesses.

Disclaimer. The names of specific products and vendors, included in the case studies, is for information purposes only, and does not imply any type of endorsement by CDPHE.

P2 Case Studies for Printing

Type of P2 Project	Page
Low- VOC Cleaning Solvents	1
Vegetable-based Inks	7
Reduced Alcohol Use	9
Reuse of Waste Ink	11
Improved Duplicating Equipment	13

Pollution Prevention Case Study

Print Shops: Switch to a Low VOC Press Wash

Company	**Colt Reproduction** 2525 Frontier Road, Boulder, CO 80301
Person to Contact	John Grein, Gen. Manager Telephone: (303) 449-2760 Ext. 109
Product or Service	Commercial Printing
Number of Employees	28
Waste Stream Targeted	**Blanket and Roller Wash, VOC emissions**
Original System	**Varn "Duplicator Wash"**, a quick-drying wash for small presses. Contains 5.1 lb/gal VOCs. Colt used 10 gal/month as a blanket and roller wash on Ryobi 3302M two-color press and AB Dick Series 9800 one-color press.
New System (with P2 Modification)	**Varn "Airo-clean WM"**, low VOC, water-miscible blanket and roller wash for use on the same presses. Contains only 4.1 lb/gal VOCs, and is mixed with 50% water, which reduces the solvent usage by ~50% and solvent VOC emissions by ~60%.
Cost Savings Initial Equipment Costs Material Costs Total Cost savings	 None Duplicator Wash costs $75.85/5-gallon container. At 10 gal/month the material cost is **$1800/yr**. Airo-clean WM costs $12.45/gal. For 5 gal/month (since it is mixed with 50% water only half as much is used) the cost would be **$750/year**. **~$1050/yr**
Major Benefits	**Cost savings of $1050/yr.** **Lowers VOCs from solvents by~370 lb/yr or ~60%.** **Improved quality - water miscible solvents remove gum and paper glaze simultaneously with ink.** Prolongs roller and blanket life. Improved public image by recognition as a "Business Partner for a Clean Environment" by the City/County of Boulder. Improved worker health and safety.

Company	**Colt Reproduction** 2525 Frontier Road, Boulder, CO 80301
Obstacles	Airo-clean WM is not yet available in 5-gallon containers, which is inconvenient because 1-gallon containers do not allow the solvent to be pumped directly to the equipment. The new solvent dries more slowly. However, the cleaning process takes less time overall because the new solvent cleans more thoroughly.
Time Since Implementation	2 years.
Source/Supplier	Varn Products Company, Inc. 14000 Westfair East Drive Houston, Texas 77041 Rep: Ron Robb (303) 692-9199 Dixon Paper Company Telephone: (303) 371-7510 3900 Lima Denver, CO 80239
Main Reason Implemented	Improve worker health and safety, public recognition by City of Boulder.
Key to Success in Making this P2 Modification	Management support for P2 and employee involvement.

10/31/95

Pollution Prevention Case Study

Print Shops: Lower VOC Blanket and Roller Wash

Company	**D & K Printing** 2930 Pearl Street, Boulder, CO 80301
Person to Contact	Jim Kinkead, Manager Telephone: (303) 444-1123
Product or Service	Commercial Printing
Number of Employees	46
Waste Stream Targeted	**VOC emissions from blanket and roller washes**
Original System	**Prisco Powerklene UK Blanket and Roller Wash** for use with Heidelberg Speed-Master 4-color, 40 inch and 5-color, 28 inch presses. Powerklene has a VOC content of 6.67 lb/gallon.
New System (with P2 Modification)	**Prisco Environmental Series (PES), VOC Reduction Program** for reducing the VOCs in blanket and roller washes used with the Heidelberg Speed-Master presses. D & K Printing is using Step 1 of the PES Program (PES 153 Blanket/Roller Wash.). Step 1 reduces the VOC content of the current blanket and roller wash by ~20% (PES 153 contains 5.3 lb/gal VOCs). Subsequent steps (product changes) would further reduce VOCs in the blanket/roller wash.
Cost Savings Initial Equipment Costs Operating Costs	 None D&K used ~1-55 gal drum of Powerklene/month @$327.25/55-gallon or ~$3,900/year. D&K uses a similar quantity of PES 153 @ $360.25/55-gallon or ~$4,300/year, so costs have increased slightly. However, they believe less PES 153 will be used when they have fully adjusted to the new product (since it evaporates more slowly), which may result in a slight overall cost savings.

Company	**D & K Printing** 2930 Pearl Street, Boulder, CO 80301
Major Benefits	**PES 153 reduces VOC emissions from blanket/roller washes by ~20%.** **Improved business image by recognition as a "Business Partner for a Clean Environment" by the City/County of Boulder.** Improved worker health and safety, liability reduction - reduces problems with skin irritation from traditional washes.
Obstacles	Takes slightly longer to dry.
Time Since Implementation	6 months
Source/Supplier	Prisco Merchandising Telephone: 1(800) 338-2241 DBA Printers' Service 6741 Exchange Drive Mansfield, TX 76063
Main Reason Implemented	Improve worker health and safety and reduce VOC emissions. To be recognized as a "Business Partner" by the City/County of Boulder.
Key to Success in Making this P2 Modification	Assistance and information from the vendor.

10/31/95

Pollution Prevention Case Study

Printing Shops: Switch to Low VOC Blanket/Roller Wash

Company	**Rocky Mountain News** 5090 N. Washington Denver, CO 80216
Person to Contact	Michael Galusha, Pressroom Mgr. Telephone: (303) 892-2024
Product or Service	Rocky Mountain Newspaper Printing/Binding/Advertising
Number of Employees	600
Waste Stream Targeted	**Blanket/Roller Wash - VOC emissions**
Original System	**VWM Met Blanket/Roller Wash** for Metro presses. This product is an oil-based solvent blend with a VOC content of 7.2 lb/ gal. VWM Metwash was used with Goss Color-liner, 4-high configuration cold-Webb Offset Presses (non-heat set). Employees dispersed the cleaner from a 55-gallon drum into pint buckets without lids and the product was applied with cloth wipes to clean the blankets and rollers.
New System (with P2 Modification)	**Varn Bio-News Concentrate Biodegradable Blanket/Roller Wash** is a water-based detergent blanket wash for water-based newspaper inks. Contains less than 5% of the VOC content of standard washes 0.32 lb/gal. Bio-News is pumped from a 350-gallon covered, reusable tote into 5-(30) gallon stainless steel tubs on wheels. Bio-News is pumped from these containers into an empty tub with cloth wipes for cleaning.
Cost Savings Initial Equipment Costs Material Cost Savings	 None 350 gallons of Varn Bio-News is used every 9 weeks @ $4.50/gallon or ~$9,100/year. Bio-News is diluted with water 6:1 while VWM is used as a concentrated solution. 350 gallon of VWM Wash was used every 4 weeks at a cost of $3.50/gallon or ~$15,900/year. This is a **cost savings of ~$6,800/year!**

Company	**Rocky Mountain News** 5090 N. Washington Denver, CO 80216
Major Benefits	**Cost savings of ~$6,800 per year!** **Reduced VOC emissions from blanket/roller washes by ~31,000 lb/yr or ~95%!** **Positive business image.** Improved worker health and safety. Employee satisfaction with the use of a less hazardous, low odor blanket/roller wash. Cleans better - new product removes solvent soluble and water soluble glaze. Reduced potential for accidents, spills from product transport.
Obstacles	Stronger solvent such as VWM is still required to clean some parts such as ink pans. Cleaning with Bio-News requires slightly more time.
Time Since Implementation	2 years
Source/Supplier	Varn Products Company, Inc. 14000 Westfair East Drive Houston, TX 77041 Rep: Ron Robb (303) 692-9199
Main Reason Implemented P2 Modification	Improve worker health and safety. Reduce costs.
Key to Success in Making this P2 Modification	Management support/commitment to P2 and efforts of Rocky Mountain News Safety Committee. Information and assistance from vendor.

11/10/95

Pollution Prevention Case Study

Print Shops: Switch to Low VOC, Soy-based Inks

Company	D & K Printing 2930 Pearl Street, Boulder, CO 80301
Person to Contact	Jim Kincaid, Manager Telephone: (303) 444-1123
Product or Service	Commercial Printing
Number of Employees	46
Waste Stream Targeted	VOC emissions from inks
Original System	**Sun Chemical Oil-based Inks**. Conventional sheet-fed oil-based inks for use with Heidelberg Speedmaster 4-color, 40 inch and 5-color, 28 inch presses. The inks contain an average of 35% VOCs.
New System (with P2 Modification)	**Sun Chemical Natural Lith Soy-based Inks.** Petroleum-based oils in conventional inks are replaced with soy oils. The soy-based inks contain ~10% VOCs.
Cost Savings Initial Equipment Costs Material Cost Savings	 None. (No equipment modifications are necessary.) D & K used ~5,000 lb/year of inks. Oil-based inks cost an average of $5.33/lb or $26,600/year. Soy-based inks cost an average of $4.88/lb or $24,400/year. This is a **total cost savings of ~$2200/yr.**
Other Benefits	**Reduced VOC emissions from inks by ~25%.** **Colors are cleaner and brighter** than with oil-based inks. Soy-based inks make it easier to use less alcohol in the fountain solutions because they are more compatible with water. Improved worker health and safety, liability reduction. Positive Business Image.
Obstacles	Some slight adjustments in operating conditions are required with switch to new inks. (However, D & K has not found any difference in drying time between oil and soy-based inks.)
Time Since Implementation	6 months.

Company	D & K Printing 2930 Pearl Street, Boulder, CO 80301
Source/Supplier	Sun Chemical Telephone: (303) 373-2655 11925 East 49th Denver, CO 80239
Main Reason Implemented	Reduce VOC emissions and improve worker health and safety. To become a "Business Partner" recognized by the City/County of Boulder.
Key to Success in Making this P2 Modification	Management support/commitment to P2 and improving worker health and safety.

10/31/95

Pollution Prevention Case Study

Print Shops: Switch to Alcohol-Free Fountain Solution

Company	**Johnson Printing** 1880 South 57th Court Boulder, CO 80301
Person to Contact	Allen Andrews, Project Manager Telephone: (303) 443-1576
Product or Service	Commercial Printing
Number of Employees	122
Waste Stream Targeted	**Alcohol emissions (VOCs) from fountain solutions**
Original System	**Fountain Solution with 20% Isopropyl Alcohol (IPA)** for sheet-fed and non heat-set web lithographic printing. Alcohol is used as a wetting agent in the fountain solution to decrease the surface tension of the solution. This allows the printer to use less water on the plate for better ink control. VOC content of IPA is 6.5 lb/gallon.
New System (with P2 Modification)	**Alcohol-free Fountain Solution** is used for sheet-fed and non heat-set web lithographic printing. 10% Rycoline 9-289 Alcohol Replacement is used in combination with 187-A Fountain Solution Etch. This formulation results in a 60% reduction in VOCs from the fountain solution.
Cost Savings Initial Equipment Costs Operating Cost Savings	None. (No equipment modifications are necessary.) There are no cost savings associated with this improvement. (Total operating costs remain about the same.) Labor costs are slightly higher due to more precise (labor- intensive) operating conditions required without alcohol. The new fountain solution is more expensive, but substantially less is required, so material costs remain about the same.
Major Benefits	**VOC emissions from fountain solutions are reduced by ~60% (~8,000 lb/year).** **Improved business image with customers and the community.** Improved worker health and safety, liability reduction. Company and employee satisfaction and pride in reducing pollution and benefiting the environment.

Company	**Johnson Printing** 1880 South 57th Court Boulder, CO 80301
Obstacles	Lost production time and labor required to experiment with new fountain solutions and operating conditions. The new formulation doesn't work as well with metallic inks; more difficult jobs may require the use of IPA.
Time Since Implementation	4 years
Source/Supplier	H & S Supply Telephone: (303) 298-8555 5961 Marion Drive Denver, CO 80216
Main Reason Implemented	Reduce VOC emissions. Improve business image.
Key to Success in Making this P2 Modification	Vendor assistance and information.

1/16/96

Pollution Prevention Case Study

Printing Shops: Reuse of Leftover Ink

Company	**Signal Graphics** 8368 N. Sheridan Blvd., Westminster, CO 80003
Person to Contact	Rick Garcia Telephone: (303) 426-5522
Product or Service	Printing
Number of Employees	4
Waste Stream Targeted	**Waste Inks**
Original System	**Disposal of Leftover Inks** Spent/leftover inks from two-AB Dick 9800 series offset presses are placed in designated waste containers and picked up by a waste hauler for off-site treatment/disposal. Little recycle/reuse of leftover inks.
New System (with P2 Modification)	**Recycle/reuse of Leftover Inks** Ink trays are filled with only enough ink for each run or shift, and unemulsified inks are returned to their containers. Leftover inks are segregated according to color and type of ink and are combined into containers for reuse. Crisco (shortening) is used to thin the ink as needed for reuse. Fibers and debris can be found in recycled/reused ink; therefore, the ink is reused on print jobs such as bond runs where high quality is not as important.
Cost Savings Initial Equipment Costs Material Cost Savings Waste Disposal Costs Total Cost Savings	 None Signal Graphics purchases ~60 lbs. of inks (colored, black, and white) every 3 months at a cost of $500.00 or ~$2,000/year. They save >**5% (~$100/yr)** on the purchase of new ink since they are able to reuse ~ 3 lbs. of spent inks per month. Reduces waste disposal by ~3 lb/month. At $300/55-gallon drum, this is a cost savings of ~**$200/yr**. **~$300/yr**

Company	**Signal Graphics** 8368 N. Sheridan Blvd., Westminster, CO 80003
Major Benefits	**Cost savings of ~300/yr.** Reduced ink waste generation by ~40 gal/yr, and reduced associated liabilities.
Obstacles	Cannot use recycled ink on all jobs due to contamination with fibers and debris which can cause marks.
Time Since Implementation	2 years
Source/Supplier	
Main Reason Implemented	Reduce operating costs. Reduce waste disposal costs and liabilities.
Key to Success in Making this P2 Modification	Management commitment to P2/waste minimization efforts.

10/27/95

Pollution Prevention Case Study

Print Shops: Equipment Modification to Reduce Wastes

Company	**Jefferson County Public School Printing Department** 809 Quail Street, Bldg. #1, Lakewood, CO 80215
Person to Contact	Rick Rowe Telephone: (303) 982-2273
Product or Service	Low volume printing services for Jefferson Co. Public Schools - 90-95% black inks.
Number of Employees	7
Waste Stream Targeted	**Ink, Solvent emissions and waste**
Original System	**Conventional Small Offset Presses** are used: an Itek 975 PFA Press and a Multi-Graphics 1250 (one-color). These presses run 5,000 impressions per hour one-sided (Multi-Graphics) to 8,000 impressions per hour double-sided (Itek), and require the use of oil or rubber-based inks.
New System (with P2 Modification)	**Duplicators are used in place of the offset presses.** Two new duplicators were purchased: a Risograph GR 3750 Duplicator and a Gestetner Duplicator 5380. These are used for low to medium-range one-sided, primarily one-color printing. These units take an original document, digitally scan the image, and transfer it to a master via a thermal imaging process. The **master is biodegradable**. **Water-based ink** is microprocessor-controlled and vacuum drawn from a cartridge, **eliminating ink waste. Use of hazardous solvents for clean-up is also eliminated.** The print drum can be quickly changed for color printing. Prints 8,000 impressions/hr. Can run 5,000 - 10,000 impressions/plate.
Cost Savings	
Initial Equipment Costs	Risograph GR 3750 Duplicator - ~$16,000 (manuf. suggested retail). Gestetner 5380 Duplicator - ~$15,000.
Material Costs	Total material costs for both duplicators:~ $10,000/yr, vs. ~$24,000/yr for offset presses, a **material cost savings of ~$14,000/yr.**
Waste Disposal Cost Savings	Waste disposal cost savings have not been quantified. However, **JeffCo predicts a 90-95% reduction in generation of ink and solvent wastes.**

Company	**Jefferson County Public School Printing Department** 809 Quail Street, Bldg. #1, Lakewood, CO 80215
Major Benefits	**Savings of ~$14,000/yr in material costs.** **Maintenance costs are significantly reduced** (but have not been quantified). **Use of hazardous inks/solvents is eliminated,** thereby reducing VOC and HAP emissions, worker health and liability concerns, hazardous waste generation, and associated regulatory requirements. **Positive business image.** Very little initial training is required; the duplicators are easy to operate, much like a copy machine.
Obstacles	Itek 975 and Multi-1250 offset presses are better for long runs (>10,000 impressions) and multi-color one pass printing. A print drum must be changed in the duplicators to change colors, requiring multiple passes for multi-color jobs.
Time Since Implementation	60 days
Source/Supplier	Gestetner, 445 Union Blvd., Suite 112 Lakewood, CO 80228 Rep: Jeffrey Lopez (303) 989-4499 RISO (Frontier Business Products), 13800 E. 39th Aurora, CO 80011 Rep: Glen Roberts (303) 373-2900
Main Reason Implemented	Looking for alternatives for Multi-1250 presses due to increased costs to repair/rebuild older machines. Reduce hazardous waste generation.
Key to Success in Making this P2 Modification	Vendor recommendations on state-of-the-art products/equipment.

11/2/95

Colorado Department of Public Health and Environment

P2 and Recycling Resource Listing for Printers

COLORADO Pollution Prevention PROGRAM

Recycling of Containers

5-gallon plastic containers (#2 plastic [HDPE]):
Invisible Structures, (303)373-1234

55-gal drums:
1. Denver Barrel and Drum Company, 295-0404
2. Greif Brothers Corporation, (303)772-1167

Vegetable-based, low VOC Inks

1. Crawford Printing Ink Company, (303)733-1818
2. Flint Ink Corporation, (303)373-2297
3. Gans Ink & Supply Company, (303)373-2420

Low VOC Cleaning Products

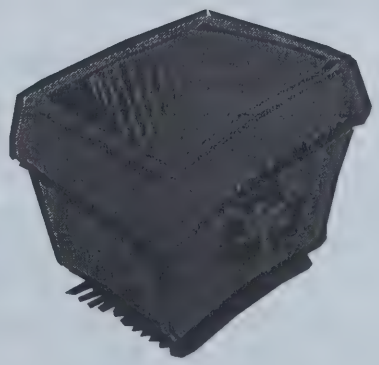
1. Varn Products Company, (303)692-9199
2. Flint Ink Corporation, (303)373-2297
3. 3-M Corporation, (303)290-9142
4. Safety-Kleen, (303)761-8614

Alcohol-free Fountain Solutions

Consult your usual product vendors, talk to other printers, or ask for assistance through your trade association.

Photo-Chemical and Photographic Film Recyclers, Silver Recovery Equipment

See list on reverse side of page.



Colorado Photochemical Recycler List

The following is a list of companies potentially offering photochemical recycling services in the state of Colorado. The Colorado Department of Public Health and Environment (the Department) in no way recommends, endorses, or certifies any of the listed companies. You may wish to consult local telephone and business directories for additional listings. Under the provisions of the Open Records Act [(Section 24-72-201, et seq, C.R.S. (1992 Supp.)], you may request to review any available records pertaining to the hazardous waste compliance history of these companies by contacting the Hazardous Materials and Waste Management Division of the Colorado Department of Public Health and Environment at (303)692-3301.

Please note that generators of hazardous waste (includes recycled materials) must ensure delivery of the material to a legitimate treatment, storage, disposal, or recycling facility. [See 6 CCR 1007-3, especially Section 261.5 (conditionally exempt small quantity generators), Section 261.1 (recycling), Section 262.20 (hazardous waste manifest), and Section 100.10 (permitted facilities)]. You may address questions regarding interpretation of the hazardous waste and recycling regulations by contacting the Hazardous Materials and Waste Management Division at (303)692-3301.

NAME AND ADDRESS	CONTACT PERSON PHONE NUMBER	ON-SITE SILVER RECOVERY*	OFF-SITE SILVER RECOVERY**	POSSIBILITY OF LEASE	MAINTENANCE AFTER INSTALLATION	MINIMUM VOLUME REQUIREMENT	SCRAP FILM RECYCLE	BENEFIT FROM THE SILVER	FEES	FILM AND CHEMICAL SALES	CONTRACT AGREEMENT
Ally Metals 18999 Road 39 LaSalle, CO 80645	Mark Magnuson (303)284-7955	Electrolytic units and cartridges	No	No in most cases	Yes. Frequency depends on set up and fixer volume.	Yes	Yes. Frequency depends on volume.	Yes	Yes	No	Volume and product determine frequency of visit
Colorado Recovery 1732 Wilcox Court Ft. Collins, CO 80524	Dennis Olson (303)484-9494	Electrolytic units and cartridges	No	Yes	Yes. Frequency depends on fixer volume	No	Yes. Frequency depends on volume.	Yes	Yes	No	Contact vendor for details
Environmental Services, Inc. 4026 S Parker Road, Suite 132 Aurora, CO 80014	Sandy Fitzgerald (303)690-1414	Electrolytic units, cartridges, and Eco-filters	No	Yes	Yes. Frequency depends on fixer volume	No	Yes. Scrap film is collected at every service call.	Yes	No	No	Customers receive money from the reclaiming silver and there is no charge for maintenance services
Merry X-Ray Chemical Corp. 1441 W. Bayaud St., Suite 2-A Denver, CO 80223	Phillip Glass (303)698-1701	Yes	Yes Eco-filters	No	Yes Monthly.	Yes (5 gallons of used fixer)	Yes. Semi-annually.	No	Yes	Yes	Purchase of chemicals and/or films is required to get scrap film picked up and/or be on the silver recovery program
Picker International, Inc 3250 Quintin Street. Suite 120 Aurora, CO 80011	Steven Crites 1-800-866-8507 Ext. 8066	Recirculating electrolytic units, and cartridges	No	No	Yes. Generally every 30-60 days	No	No	Yes	Yes for maintenance	Yes	Purchase of chemicals and/or films is required to be on the silver recovery program. Silver recovery equipment is also sold separately.
Quicksilver, Inc. 14677 E. Easter Ave. Englewood, CO 80112	Dennis Scott (303)680-0770	Yes	No	Yes	Yes Quarterly.	No	Yes. As contacted.	Yes	Yes	No	Contact vendor for details
Rocky Mountain Radiographics 9505 N. Tomahawk Road parker, CO 80134	James Blackburn (303)841-3561	Electrolytic units and cartridges	No	Yes	Yes. Frequency depends on fixer volume.	No	Yes. As contacted/ scheduled.	Yes	Yes	Yes	Contact vendor for details
Southwest Radiographics, Inc. -1001 E. 64th Ave. Denver, CO 80229 -3509 East St Vrain Street Colorado Springs, CO 80903 -507 Fruitvale Court, Suite C Grand Junction, CO 81504	Karen Rainey 1-800-678-9729 or (303)288-9729 (719)591-5974 (303)434-9729	Electrolytic units, cartridges, on-line, and off-line recirculation units	Yes Eco-filters	Yes	Yes. Frequency depends on type of unit and fixer volume.	Yes (5 gallons/week) if using the Eco-filter system. No if using other methods	Yes. Frequency depends on volume	Depends on type of units and volume	Depends on type of unit and volume	Yes	In most cases, customers do not claim the benefits from the reclaimed silver, and in exchange there is no charge for maintenance and pick up of used fixer
T.G. X-Ray Ltd 5 S. Kalamath Denver, CO 80223	Tim Gallenstein (303)623-4333	Yes	Yes, only on hand tanks	No	Yes	No	Yes	Yes only from scrap film	Yes only on hand tanks	Yes	Contact vendor for details
X-Ray Service and Supply 6845 Hotel St. #E Green Mountain Falls, CO 80819	Paul Goodier (719)681-4705 1-800-569-9729	Electrolytic units and cartridges	Yes	Yes. Lease and lease-purchase programs are available	Yes. 4-8 weeks depending on usage.	No	Yes when at least 50 lbs have been collected.	No	Yes only for contaminated photo-chemicals	Yes	There are no fees if customer buys chemicals and/or films. Otherwise, there is a nominal pick-up fee.
Xray Specialities Company -3475 Pine Tree Square Colorado Springs, CO 80909 -7100 N. Broadway Denver, CO 80221	Charles Kleebero (719)520-1511 (303)430-4344	Electrolytic units and cartridges	No	No	Yes. Monthly during processor maintenance.	No	Yes. As contacted.	No	No	Yes	Customers do not claim benefits from the reclaiming silver, and in exchange there is no charge for maintenance

* ON-SITE SILVER RECOVERY: Silver in used fixer is recovered on site using silver recovery units. Maintenance of these units is provided by the recycler.

** OFF-SITE SILVER RECOVERY: Used fixer is collected on site in plastic tanks and periodically picked up by the photochemical recycler. The silver is recovered at the recycler's site.

Colorado Department of Public Health and Environment

COLORADO Pollution Prevention PROGRAM

This list is intended to provide some general information concerning the photochemical recyclers in the state. We suggest that you contact them directly and discuss the contra terms in detail since they are subject to change.

The information in this table was provided by each company in response to a pollution prevention survey and has not been verified by the Department

Colorado
Pollution Prevention Forum

In a joint effort, the Pollution Prevention Partnership (P3) and the Colorado Department of Public Health and Environment (CDPHE) have created the Colorado Pollution Prevention (P2) forum on the Internet. The site offers a pleasing and easily navigable environment with an intuitive and non-linear interface.

PURPOSE

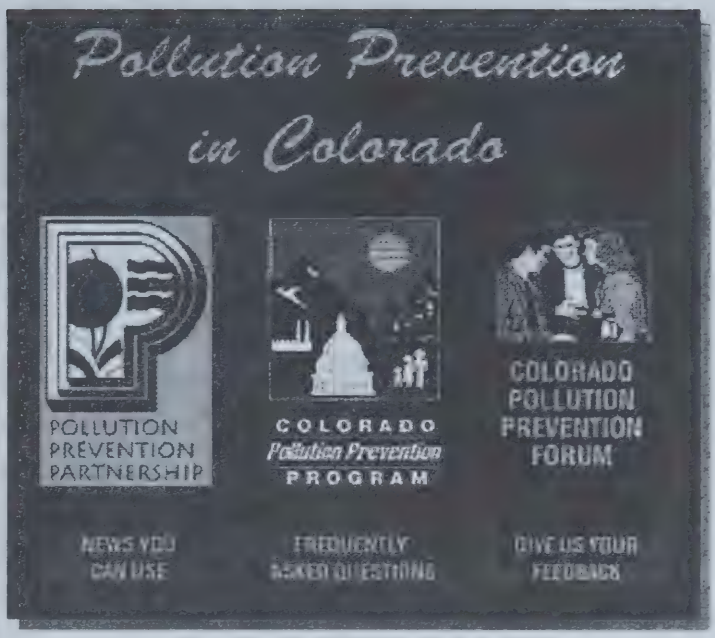
The forum was created to provide easy and timely access to P2 information and resources and to facilitate broad based communication among interested Colorado and US organizations and individuals either involved with or interested in pollution prevention. This is achieved primarily through the open broadcast e-mail forum to which any interested individual or organization can automatically subscribe themselves by following easy on-line instructions.

"The forum was created to provide easy and timely access to P2 information and resources and to facilitate broad based communication.."

FEATURES

The P2 site offers a wealth of helpful pollution prevention information including:

- Pollution prevention case studies covering a broad range of industries.
- Internet linkages to a multitude of helpful internet sites both domestically and internationally; private and public organizations and government agencies.
- A pollution prevention resource directory listing important organizations and government agency contacts which can provide valuable support, information and technical assistance.
- An extensive pollution prevention publications index and on-line order form.



- A news forum where P3 and CDPHE will post time sensitive information of general interest to pollution prevention professionals, practitioners and organizations.
- A frequently asked questions (FAQ) page answering questions most often asked of the CDPHE and P3.

Additionally, the home page displays the logos of many of the P3 partners where several logos are actual linkages to the P3 partners own home page.

HOW TO ACCESS THE SITE

Once on the Internet's World Wide Web, type in the internet address:
http://www.colorado-net.com/light/p3
in the "location" field and hit the "Enter" key; the "Pollution Prevention in Colorado" banner page shown above will show on your screen shortly. Once the banner page has loaded, simply click on the icon buttons to start exploring the page.

BROWSER PREFERENCE

The home page has been designed to take advantage of powerful features of the most popular internet world wide web browsers such as Netscape Navigator 3.0, Microsoft Explorer 3.0, Netscape NetComplete 3.2, and AOL 3.0. These browsers are recommended for maximum viewing pleasure and easy navigation .

Home Page Internet Address: http://www.colorado-net.com/light/p3

Colorado Department of Public Health and Environment

Pollution Prevention Technical Assistance Resources

COLORADO Pollution Prevention PROGRAM

Pollution Prevention Assistance

Colorado Department of Public Health and Environment (CDPHE) Pollution Prevention Program

-technical assistance, referrals, case studies, upcoming workshops, library resources

CDPHE
OE-B2-PPU
4300 Cherry Creek Drive South
Denver, CO 80222-1530

- Parry Burnap (303)692-3009
- Neil Kolwey (303)692-3309
- Tamera Van Horn (303)692-3017

Colorado State University Waste Minimization Assessment Center

- free pollution prevention assessments

Colorado State University
Department of Mechanical Engineering
Waste Minimization Assessment Center
Fort Collins, CO 80523

- Mike Kostrzewa, Research Associate (970)491-7709

Pollution Prevention Partnership

-The Partnership's membership includes prominent Colorado businesses, government agencies, and public interest groups. The member companies would like to share their pollution prevention successes with other Colorado businesses.

Pollution Prevention Partnership
1099 18th St., Suite 2100
Denver, CO 80202

- Paul Ferraro, Partnership Secretary (303)294-1200

EPA Enviro$ense

-A free, public, integrated environmental information system including P2 technical information, case studies, and other information.

Via the World Wide Web (Internet): http:\\es.inel.gov\index.html

EPA Pollution Prevention Information Center (PPIS)

-technical documents, case studies

Environmental Protection Agency
401 M. St., SW (3404)
Washington, D.C. 20460 (202)260-1023

Colorado Pollution Prevention Home Page

-Access to Colorado P2 case studies and other P2 information and resources.

Via the Internet: Http:\\www.csn.net\light\p3

Local Health Department Pollution Prevention Programs

-The following local health departments have staff dedicated to providing pollution prevention technical assistance and information:

Tri-County Health Department
4301 E. 77nd Ave
Commerce City, CO 80022-1488
●Mike Moreland (303)288-6816

Boulder County Health Department
3450 Broadway
Boulder, CO 80304
●Dave Swanson (303)441-1146

Larimer County Department of Health and Environment
1525 Blue Spruce Drive
Fort Collins, CO 80524-2004
●Judy Heiderscheidt (970)498-6792

Jefferson County Department of Health and Environment
260 S. Kipling
Lakewood, CO 80226
●Paul Saunders (303)271-5721

Mesa County Health Department
515 Patterson Road
Grand Junction, CO 81506
●Susan Kiser (970)248-6937

Pueblo City-County Health Department
151 Central Main Street
Pueblo, CO 81003
●Dan Otoupalik (719)583-4341

Trade Associations

-The following trade associations provide P2 information or assistance for their members.

American Electroplaters and Surface Finishers Society
3525 N. Cascade Ave.
Colorado Springs, CO 80907
●Bill Thomas, President (719)687-7244

Automotive Service Association of Colorado
6301 W. 44th Ave., Suite 2D
Wheatridge, CO 80033
●Joe Suman, Executive Director (303)431-9357

Professional Cleaners and Laundry Association
P.O. Box 202251
Denver, CO 80220
●Cecilia Partridge, Executive Director (303)355-1878

Rocky Mountain Fabricare Association
2150 W. 29th Avenue, Suite 200
Denver, CO 80211
●Gary Leeper, Executive Director (303)433-4446

Printing & Imaging Association, Mountain States
5031 S. Ulster St., #350
Denver, CO 80237
●Jim Frey, executive Director (303)771-1578

Energy Conservation

Climate-Wise Program

-technical assistance and recognition for successful energy conservation efforts
U.S. Department of Energy
1617 Cole Blvd.
Golden, CO 80401
●Jerry Kotas (303)275-4714

office of Energy Conservation

1675 Broadway, Suite 1300
Denver, CO 80202
●Anne Elkins, Program Manager (303)620-4292

Energy Analysis and Diagnostic Center

-free energy audits for small manufacturing facilities with standard industrial codes 20 through 39.
Colorado State University
●Mike Kostrzewa (970)491-7709

Water Conservation

Office of Water Conservation

Department of Natural Resources, Office of Water Conservation
1313 Sherman St.
Denver, CO 80203
●Chris Bridges, Program Manager (303)866-3441

Solid Waste Reduction

Rocky Mountain Materials Exchange

-Subscribers gain access to information on possible markets for reusable materials.
999 18th St., Suite 2750
Denver, CO 80202
●Shaun Egan, Project Manager (303)297-0180

Office of Energy Conservation

-The OEC manages an electronic bulletin board system with information about recycling markets for many common materials.
1675 Broadway, Suite 1300
Denver, CO 80202
●Kelly Roberts, Recycling Coordinator (303)620-4292

Colorado Department of Public Health and Environment

POLLUTION PREVENTION TOOLKIT: PRINTING -EVALUATION FORM-

COLORADO Pollution Prevention PROGRAM

WITH YOUR FEEDBACK, WE CAN BETTER MATCH YOUR NEEDS AND CONTINUE TO MAKE POLLUTION PREVENTION THE "ENVIRONMENTAL MANAGEMENT TOOL OF FIRST CHOICE."

1. WAS THE INFORMATION PRESENTED TO YOU IN A CLEAR, CONCISE AND EASY TO UNDERSTAND FORMAT?

☐ VERY CLEAR ☐ ☐ SOMEWHAT CLEAR ☐ ☐ NOT AT ALL CLEAR

2. PLEASE RANK THE FOLLOWING SECTIONS OF THE TOOLKIT:

IF YOU CHECK OFF NOT HELPFUL, PLEASE EXPLAIN OR TELL US HOW TO IMPROVE IN LINE BELOW.

FACT SHEET FOR PRINTERS: ENVIRONMENTAL REGULATIONS

☐ VERY HELPFUL ☐ ☐ SOMEWHAT HELPFUL ☐ ☐ NOT AT ALL HELPFUL

A SMALL-BUSINESS GUIDE TO HAZARDOUS WASTE GENERATOR REQUIREMENTS

☐ VERY HELPFUL ☐ ☐ SOMEWHAT HELPFUL ☐ ☐ NOT AT ALL HELPFUL

POLLUTION PREVENTION CHECKLIST FOR PRINT SHOPS

☐ VERY HELPFUL ☐ ☐ SOMEWHAT HELPFUL ☐ ☐ NOT AT ALL HELPFUL

POLLUTION PREVENTION FACT SHEET - REDUCING ALCOHOL IN FOUNTAIN SOLUTIONS

☐ VERY HELPFUL ☐ ☐ SOMEWHAT HELPFUL ☐ ☐ NOT AT ALL HELPFUL

POLLUTION PREVENTION FACT SHEET - MANAGEMENT OF SOLVENTS AND WIPES IN THE PRINTING INDUSTRY

☐ VERY HELPFUL ☐ ☐ SOMEWHAT HELPFUL ☐ ☐ NOT AT ALL HELPFUL

POLLUTION PREVENTION FACT SHEET - LITHOGRAPHIC INK WASTES

☐ VERY HELPFUL ☐ ☐ SOMEWHAT HELPFUL ☐ ☐ NOT AT ALL HELPFUL

POLLUTION PREVENTION IN THE PRINTING INDUSTRY: CASE STUDIES

☐ VERY HELPFUL ☐ ☐ SOMEWHAT HELPFUL ☐ ☐ NOT AT ALL HELPFUL

P2 AND RECYCLING RESOURCE LISTING FOR PRINTERS

☐ VERY HELPFUL ☐ ☐ SOMEWHAT HELPFUL ☐ ☐ NOT AT ALL HELPFUL

COLORADO MSDS FACT SHEET

☐ VERY HELPFUL ☐ ☐ SOMEWHAT HELPFUL ☐ ☐ NOT AT ALL HELPFUL

Pollution Prevention Technical Assistance Resources

☐ ☐ ☐ ☐ ☐

VERY HELPFUL — SOMEWHAT HELPFUL — NOT AT ALL HELPFUL

3. Overall, did you find this toolkit to be:

☐ ☐ ☐ ☐ ☐

VERY HELPFUL — SOMEWHAT HELPFUL — NOT AT ALL HELPFUL

4. Do you have any technical questions that were not answered by the toolkit? If so, what are they:

_____

_____

_____

_____

5. Would you like to receive a free, confidential pollution prevention assessment? If so, please fill out the information below. We will have a pollution prevention engineer contact you to set up an appointment.

Company Name _____

Contact Name _____

Address _____

City _____ State _____ ZIP Code _____

6. Tell us how we can better help you. What would you change about this toolkit to make it easier to understand and more useful?

_____

_____

_____

_____

Please mail your completed evaluation form to:

CO Dept. of Public Health & Environment
OE-B2B-PPP
4300 Cherry Creek Drive South
Denver, CO 80222-1530

686.2 POLLUTION PREVENTION
C718p TOOL KIT : PRINTING.
DATE DUE

686.2 POLLUTION PREVENTION
C718p TOOL KIT : PRINTING.

5/5/98 Env. Can. Library

Hazardous Waste Research
and Information Center
Library
One East Hazelwood Drive
Champaign, IL 61820
217/333-8957

DEMCO

P2 TIPS:
GOOD OPERATING PRACTICES

The following practices are simple and inexpensive to implement. They are practical for businesses of all sizes, and can help to significantly reduce waste treatment and disposal costs:

- Establish formal procedures to prevent or reduce leaks and spills.
- Store raw materials in a separate area from waste materials.
- Develop tighter inventory control procedures. Buy only the amount needed, just-in-time, and use oldest materials first to prevent unused materials from exceeding their shelf-life.
- Properly label all process tanks to prevent cross-contamination and to maintain process solutions at the proper concentration.
- Keep contaminants out of process solutions to maximize their lifespan. Periodic filtering and/or treating of solutions can also extend solution lifespan.
- Segregate waste streams to facilitate material reuse and recycling, and to reduce waste treatment and disposal costs.

UNIVERSITY OF ILLINOIS-URBANA
3 0112 109104932

Colorado Department
of Public Health
and Environment

Colorado Department of Public Health
and Environment
Pollution Prevention Program
4300 Cherry Creek Drive South OE-B2
Denver, CO 80222-1530
(303) 692-3099